REMARKS

By this amendment, claims 3, 20 and 21 have been amended in the application. Currently, claims 3-5, 7, 9, 10, 12, 14-15 and 20-22 are pending in the application.

Claims 3-5, 7, 9-10, 12, 14-15 and 20-22 were rejected under 35 USC 103(a) as being obvious over Kawakami et al. (JP 1-242782). Also, claims 3-5, 7, 9-10, 12, 14-15 and 20-22 were rejected under 35 USC 103(a) as being obvious over Kawakami et al. in view of Weber et al. (U.S. Patent No. 6,274,241). Further, claims 3-5, 7, 9-10, 12, 14-15 and 20-22 were rejected under 35 USC 103(a) as being obvious over Kawakami et al. or Kawakami et al. in view of Weber et al., further in view of Segawa et al. (JP 2001-316834).

These rejections are respectfully traversed in view of the amendments to the claims and the remarks below.

The present invention relates to a conductive electroless plated powder and a method for making the same. More particularly, the present invention relates to a conductive electroless plated powder including core particles and a nickel film provided on each core particle, the nickel film having improved adhesion with the core particle (see page 1, lines 8-13 of the specification).

In the nickel film formed on the surface of the core particle, crystal grain boundaries are not recognized in the cross section in the direction of the thickness of the nickel film, i.e., perpendicularly to the surface of the core particle as shown in Fig. 1 (see page 5, lines 11-15 of the specification).

In the nickel film in which crystal grain boundaries are not recognized as shown in Fig. 1, unexpected results have been found which include that the adhesion between the nickel film and the surface of the core particle is remarkably high. The film becomes dense and homogeneous, resulting in an increase in adhesion between the nickel film and the surface of the core particle (see page 6, lines 1-9 of the specification).

The method for making the plated powder mainly includes a catalyzation step (1), an initial thin film formation step (2), and an electroless plating step (3). In the catalyzation step, the core particles which have a noble metal ion-capturing ability or to which a noble metal ion-capturing ability is imparted by surface treatment are allowed to capture noble metal ions, and then the noble metal ions are reduced so that the surfaces of the core particles support the noble metal. In the initial thin film formation step (2), the core particles supporting the noble metal are dispersed in an initial thin film-forming solution containing

nickel ions, a reducing agent, and complexing agent composed of an organic carboxylic acid or a salt thereof so that nickel ions are reduced to form initial thin nickel film on the surfaces of the core particles. In the electroless plating step (3), a nickel ion-containing solution containing the complexing agent and a reducing agent-containing solution are individually and simultaneously added to an aqueous suspension containing the core particles provided with the nickel initial thin film and the complexing agent to carry out electroless plating (see page 10, line 13 - page 11, line 10 of the specification).

By this amendment, independent claim 3 has been amended to recite the steps of "(II) adding a slurry, which includes the core particles prepared by said step of (I) allowing core particles, into an aqueous medium comprising an initial thin-film-forming solution containing nickel ions, a reducing agent, and a complexing agent comprising an organic carboxylic acid or a salt thereof to prepare an aqueous suspension, dispersing the core particles in the initial thin film-forming solution, and reducing the nickel ions to form a nickel initial thin film on the surface of the core particles; and (III) adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension

containing the core particles having the initial thin film on the surface thereof so as to perform electroless plating and so that grainless boundaries are recognized in cross section in a direction of a thickness of the nickel film".

Similarly, independent claim 20 has been amended to recite the steps of "(II) adding a slurry, which includes the core particles prepared by said step of (I) allowing core particles, into an aqueous medium comprising an initial thin-film-forming solution containing 1) nickel ions, 2) a reducing agent including one of sodium hypohosphite, sodium borohydride, potassium borohydride, dimethylamine borane, hydrazine and formalin, and 3) a complexing agent comprising an organic carboxylic acid or a salt thereof to prepare an aqueous suspension, dispersing the core particles in the initial thin film-forming solution, and wherein said step of dispersing the core particles in the aqueous medium includes adjusting the reducing agent in the initial thin film-forming solution in the range between 4×10^{-4} and 2.0 mol/l so that the nickel ions are reduced to form initial thin nickel film on a surface of each of the core particles; and (III) adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles

having the initial thin film on the surface thereof so as to perform electroless plating and so that grainless boundaries are recognized in cross section in a direction of a thickness of the nickel film". These features are not shown or suggested by Kawakami et al. Weber et al. and Segawa et al. or any combination of these references.

Kawakami et al. relate to an electroless plated powder and a production process therefore (see page 1, lines 14-15 of the translation).

Kawakami et al. disclose the step of allowing a core material to trap noble metal ions, and then reducing the ions to carry the metal on the surface of the core material (see page 14, lines 19-24 and page 15, lines 5-7 of the translation).

Kawakami et al. also disclose the step of dispersing the powder of the core material in an aqueous suspension (page 16, line 11 - page 17, line 10 of the translation).

Kawakami et al. also disclose the step of adding at least two solutions constituting the electroless plating solution individually and simultaneously to the aqueous suspension to perform an electroless plating (see page 18, line 23 - page 19, line 6 of the translation).

Kawakami et al. do not disclose the steps of (II) adding a slurry, which includes the core particles prepared by the step of (I) allowing core particles, into an aqueous medium comprising an

initial thin-film-forming solution containing nickel ions, a reducing agent, and a complexing agent comprising an organic carboxylic acid or a salt thereof to prepare an aqueous suspension, dispersing the core particles in the initial thin film-forming solution, and reducing the nickel ions to form a nickel initial thin film on the surface of the core particles; and (III) adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles having the initial thin film on the surface thereof so as to perform electroless plating and so that grainless boundaries are recognized in cross section in a direction of a thickness of the nickel film as claimed in independent claim 3.

Kawakami et al. also do not disclose the steps of (II) adding a slurry, which includes the core particles prepared by the step of (I) allowing core particles, into an aqueous medium comprising an initial thin-film-forming solution containing 1) nickel ions, 2) a reducing agent including one of sodium hypohosphite, sodium borohydride, potassium borohydride, dimethylamine borane, hydrazine and formalin, and 3) a complexing agent comprising an organic carboxylic acid or a salt thereof to

prepare an aqueous suspension, dispersing the core particles in the initial thin film-forming solution, and wherein the step of dispersing the core particles in the aqueous medium includes adjusting the reducing agent in the initial thin film-forming solution in the range between 4×10^{-4} and 2.0 mol/l so that the nickel ions are reduced to form initial thin nickel film on a surface of each of the core particles; and (III) adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles having the initial thin film on the surface thereof so as to perform electroless plating and so that grainless boundaries are recognized in cross section in a direction of a thickness of the nickel film as claimed in independent claim 20.

Applicants note that it is the Examiner's position that the step (II) of Kawakami et al. reads on the claimed step (II) of dispersing the core particles in an initial thin film forming solution because the claimed step (II) does not recite the order of adding the core particles and initial thin film forming solution (see page 3, lines 19-22 of the office action). Applicants respectfully submit that the claimed step (II) in

independent claims 3 and 20 has been amended to clarify the order of adding the core particles and initial thin film forming solution so that the method of Kawakami et al. and the present invention are clearly different from each other. In the initial thin film formation step of the present invention, an aqueous suspension is prepared by adding the slurry obtained in the claimed step (I) into the initial thin film forming solution. The initial thin film forming solution is prepared by nickel ions, a reducing agent, and a complexing agent. The core particles are mixed and dispersed in the initial thin film forming solution.

On the other hand, Kawakami et al. disclose that it is necessary to add at least two solutions constituting the electroless plating solution individually and simultaneously to the aqueous suspension to allow plating reaction (see page 19, lines 3-6 of the translation). Therefore, applicants respectfully submit that the step (II) of Kawakami et al. cannot read on the claimed step (II) of the present invention because the claimed step (II) in claims 3 and 20 clearly recites the order of adding the core particles and initial thin film forming solution.

Also, applicants note that in the office action, the Examiner admitted that Kawakami et al. fails to teach that one

more plated nickel layer is applied over the plated nickel layer by adding individually and simultaneously a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent, to the aqueous suspension containing nickel plated core particles and the complexing agent (claimed step III) (see page 3 of the office action).

However, the Examiner believed that the claimed step III would be obvious over Kawakami et al. for the following reasons. The Examiner stated that it was a well-know principle to reapply a coating composition to achieve a desired thickness of a final coating depending on intended use of the final coated product. Therefore, the Examiner believed that it would have been obvious to have reapplied a plated nickel layer in Kawakami et al., according to well-known principle, by adding the first and second solutions constituting an electroless plating solution to an aqueous solution with the expectation of providing the desired thickness of a final coating. Also, the Examiner believed that it would have been obvious to have a second nickel film layer over the applied nickel film layer in Kawakami et al. by adding to the aqueous suspension of the nickel plated core particles, a first solution and a second solution, individually and

simultaneously with the expectation of providing the desired nickel plated particles.

Thus, the Examiner believed that if the initial plated nickel layer was too thin, i.e. was not of desired thickness, the plating process can be repeated in the presence of wastewater of the initial nickel plating solution (see page 4 of the office action).

Applicants respectfully traverse the above Examiner's assumptions for the reasons discussed below.

1) Applicants respectfully submit that Kawakami et al. teach away from the presently claimed invention because of the following reasons. The present invention discloses the initial thin film formation step (the claimed step (II)) for forming an initial thin nickel film, and the electroless plating step (the claimed step (III)) for performing electroless plating so that grainless boundaries are recognized in cross section in a direction of a thickness of the nickel film.

On the other hand, in the section "The problems to be solved by the invention" in Kawakami et al., discloses that the thickness of the plating metal film is required to be as small as possible from the practical and economical point of view, and for that purpose, a uniform and strong film must be formed (see page 6, lines 12-15 of the translation). Also, in the section "the

Advantages" in Kawakami et al., discloses that consequently, according to the invention, since the metallization ratio can be set as low as possible, i.e., a strong plating film of a submicron order can be imparted, it is possible to obtain a plated powder with a low specific gravity (see page 39, line 23 - page 41, line 2 of the translation).

Accordingly, applicants respectfully submit that Kawakami et al. teach away from the presently claimed invention because Kawakami et al. requires the thickness of the plating metal film as small as possible from the practical and economical point of view. Also, applicants respectfully submit that it would not have been obvious to add a second nickel film layer over the applied nickel film layer in Kawakami et al. because Kawakami et al. already achieved a uniform and strong film with the small thickness of the plating metal film.

2) The Examiner believed that it would have been obvious to use the well-known principle of reapplying a coating composition to achieve a desired thickness of a final coating depending on the intended use of the final coated product. Applicants respectfully request that the Examiner provide documentary evidence or a reference to support the Examiner's conclusion of this point.

3) Applicants respectfully submit that in the method of Kawakami et al., control of the thickness of the plating film is based on adjusting the amount of the metal salt (addition) before adding it to the aqueous suspension. Kawakami et al. do not need to reapply the additional plating solution after completing the plating films on the core particles. In other words, the method of Kawakami et al. adds the plating solution in the aqueous suspension only one time and controls the thickness of the plating film. Therefore, Kawakami et al. never teach, suggest or disclose the second nickel film layer over the applied nickel film layer of Kawakami et al. and applicants respectfully submit that it would not have been obvious to use the well-known principle of reapplying a plated nickel layer in Kawakami et al. with the expectation of providing the desired thickness of a final coating for the reasons detailed above.

Moreover, in the present invention, the two plating solutions are added in the aqueous suspension containing the core particles provided with the initial thin nickel films (the claimed step III) because the present invention intends to make grainless boundaries recognized in cross section in a direction of a thickness of the nickel film (not controlling the desired thickness of the final coating as discussed by the Examiner). Therefore, the crystal grainless boundaries include a high

adhesion between the nickel film and the surface of the core particle. Also, the film becomes dense and homogeneous, resulting in an increase in adhesion between the nickel film and the surface of the core particle.

For these reasons, it is believed that Kawakami et al. do not show or suggest the present claimed features of the present invention. Applicants also submit that Weber et al. do not make up for the deficiencies in Kawakami et al.

Weber et al. relate to a substrate, a method of nucleation, a powder, and a method for metal plating (see column 1, lines 6-7). Glass substrates in the form of plates of glass or glass powder were nucleated with palladium and then coated with a layer of nickel/tungsten (see column 3, lines 49-52).

Weber et al. also disclose that in addition to the Ni/W alloy, layers including alloys such as Ni/Sn, Co/W and Co/Mo, a single metal such as Ni, Cu, Ag, Au and platinum metals or metal oxide can be applied (see column 5, line 45-48).

Weber et al. do not disclose the steps of (II) adding a slurry, which includes the core particles prepared by the step of (I) allowing core particles, into an aqueous medium comprising an initial thin-film-forming solution containing nickel ions, a reducing agent, and a complexing agent comprising an organic carboxylic acid or a salt thereof to prepare an aqueous

suspension, dispersing the core particles in the initial thin film-forming solution, and reducing the nickel ions to form a nickel initial thin film on the surface of the core particles; and (III) adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles having the initial thin film on the surface thereof so as to perform electroless plating and so that grainless boundaries are recognized in cross section in a direction of a thickness of the nickel film as claimed in independent claim 3.

Weber et al. also do not disclose the steps of (II) adding a slurry, which includes the core particles prepared by the step of (I) allowing core particles, into an aqueous medium comprising an initial thin-film-forming solution containing 1) nickel ions, 2) a reducing agent including one of sodium hypohosphite, sodium borohydride, potassium borohydride, dimethylamine borane, hydrazine and formalin, and 3) a complexing agent comprising an organic carboxylic acid or a salt thereof to prepare an aqueous suspension, dispersing the core particles in the initial thin film-forming solution, and wherein the step of dispersing the core particles in the aqueous medium includes adjusting the

reducing agent in the initial thin film-forming solution in the range between 4 x 10^{-4} and 2.0 mol/l so that the nickel ions are reduced to form initial thin nickel film on a surface of each of the core particles; and (III) adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles having the initial thin film on the surface thereof so as to perform electroless plating and so that grainless boundaries are recognized in cross section in a direction of a thickness of the nickel film as claimed in independent claim 20.

For these reasons, it is believed that Weber et al. do not show or suggest the present claimed features of the present invention. Applicants also submit that Segawa et al. do not make up for the deficiencies in Kawakami et al. and Weber et al.

Segawa et al. relate to apparatus for electroless plating and method for forming conductive film.

Segawa et al. disclose an apparatus for an electroless plating capable of suppressing a change of a plating liquid with time and carrying out electroless plating homogeneously and accurately, and provide a method for forming a conductive film (abstract).

Segawa et al. do not disclose the steps of (II) adding a slurry, which includes the core particles prepared by the step of (I) allowing core particles, into an aqueous medium comprising an initial thin-film-forming solution containing nickel ions, a reducing agent, and a complexing agent comprising an organic carboxylic acid or a salt thereof to prepare an aqueous suspension, dispersing the core particles in the initial thin film-forming solution, and reducing the nickel ions to form a nickel initial thin film on the surface of the core particles; and (III) adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles having the initial thin film on the surface thereof so as to perform electroless plating and so that grainless boundaries are recognized in cross section in a direction of a thickness of the nickel film as claimed in independent claim 3.

Segawa et al. also do not disclose the steps of (II) adding a slurry, which includes the core particles prepared by the step of (I) allowing core particles, into an aqueous medium comprising an initial thin-film-forming solution containing 1) nickel ions, 2) a reducing agent including one of sodium hypohosphite, sodium

borohydride, potassium borohydride, dimethylamine borane, hydrazine and formalin, and 3) a complexing agent comprising an organic carboxylic acid or a salt thereof to prepare an aqueous suspension, dispersing the core particles in the initial thin film-forming solution, and wherein the step of dispersing the core particles in the aqueous medium includes adjusting the reducing agent in the initial thin film-forming solution in the range between 4×10^{-4} and 2.0 mol/l so that the nickel ions are reduced to form initial thin nickel film on a surface of each of the core particles; and (III) adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles having the initial thin film on the surface thereof so as to perform electroless plating and so that grainless boundaries are recognized in cross section in a direction of a thickness of the nickel film as claimed in independent claim 20.

It is therefore respectfully submitted that Kawakami et al., Weber et al., and Segawa et al., individually or in combination, do not teach, disclose or suggest the presently claimed invention and it would not have been obvious to one of ordinary skill in

the art to combine these references to render the present claims obvious.

In view of foregoing remarks, it is respectfully submitted that the application is in condition for allowance and an action to this effect is respectfully requested.

If there are any questions or concerns regarding these remarks, the Examiner is requested to telephone the undersigned at the telephone number listed below.

Respectfully submitted,

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